APPLICATION FOR

UNITED STATES LETTERS PATENT

of

Ta-Ching PONG

for

Pulse Propelling Flat Induction Motor

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Pulse Propelling Flat Induction Motor

Background Of The Invention

Vehicles with passive wheels driven by conventional electric motor, and powered by a hybrid ICE/electricity generator battery, even more recently, fuel cells, as we may know, the said electrical energy available for the application is typically limited.

And with the existing technology, the weight of the vehicle body, the electrical energy storage/generation and the related drive train is heavily influencing the duration or the total distance that user can travel with one single "re-fuel" or "re-charge".

Summary of the Invention

The fossil fuel ICE have long being tagged as the primary source of environmental pollution. Present time human achievements have being seriously hampered by such a situation as the global warming is becoming more apparent via the expression of "El Nineo" or other climate "expression". Although different technology have been developed since the first oil crisis, but it is the concern about the extinction of precious global resources that speed up the development of electrical vehicle (EV). Different technology combination have been in trial for such a long time that we finally can see some EV becoming commercially available.

However, the existing electrical motor design have limited the basic design approach that is used, i.e. a gear box and power drive train for converting the energy generated by the electrical motor into mechanical driving force is typical in a EV design. The improvement of the total distance that can be traveled with existing electrical motor and drive train technology is seriously limited. The complexity involved with the existing motor design

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Makes it a target of improvement. As can be seen in some novel motor designs that can be used as part of the wheel in a HPV (human power vehicle) so that extra drive train can be eliminated.

However, all these development fail to improve the EV drive train design. Powerful, efficient and yet robust technology is required for EV applications, as it is to be used in the same scenario of the existing IEC vehicle.

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~~It is the objective of this invention to improve such a situation with a solid robust motor~~ design that can be build as part of the wheel structure module of the existing IEC vehicle design. With such a active propelling wheel drive, the design can be easily implemented on any vehicle. The conventional gear box and drive train can be completely re-designed. The total weigh of a vehicle can be greatly reduced and superior drive efficiency can easily be implement with the digital electronic technology ~~that is available now.~~

The Flat Induction Motor (FIM) mentioned herein is a compact, flat induction motor offering a unique capability for load propulsion. It is an application of the technology developed for the electromagnetic launcher designed to accelerate projectiles. The pairs of closely spaced electrical coils winding, installed and firmly fixed on the vehicle structure straddle a segmented core block. The current is pulsed as the coils cross an edge of one segment of the core block. This induces surface currents that repel the core block, in essence, the pulsed coils push off segment edges.

With application as a electromagnetic active wheels propelling, the vehicle have less weight subjecting to be driven by the electrical energy that is available, electromagnetic braking can be used, and, relieved of the need to transmit power through drive train traction, the vehicle can be designed to provide more mileage per "re-fuel" or "RE-CHARGING".

Brief description of the drawings

Fig.1A and 1B shows a perspective view of one of the embodiment, indicating the relationship between the metal core means and the coil module means.

Fig. 2A and 2B shows a perspective view of still another embodiment, indicating the change in the design of the metal core means and the coil module means.

Fig. 3A, 3B and 3C shows a perspective view of still another embodiment, indicating the change in the design of the metal core means and the coil module means.

Fig. 4A and 4B shows a perspective view of yet another embodiment, indicating the change in the design of the metal core means and the coil module means.

Fig. 5A, 5B and 5C indicate an embodiment that employed a mechanical clutching and extra driving motors to initiate the motor running.

Fig. 6A, 6B and 6C indicate another embodiment that employed a mechanical clutching and extra driving motors to initiate the motor running.

Fig. 7A, 7B and 7C indicate yet another embodiment that employed a mechanical clutching and extra driving motors to initiate the motor running.

Fig. 8 illustrates a typical HPV with active propelling wheel.

Fig. 9A, 9B and 9C indicate an embodiment that employed a mechanical clutching and extra driving motors to initiate the motor running.

Fig. 10-1, 10-2 Prior art, illustrating a typical clutching device and a typical motor designed for HPV

References

U.S. Patent

4817494 5552649

IEEE Transactions On Magnetics, vol. MAG-18, No. 1, 01/82:

(1) Fair, Harry Jr., "Electromagnetic Propulsion: A New Initiative", pp. 4-6;

(2) Mongeau & Williams, Arc-Commutated Launcher, pp. 42-45;

(3) Burgess, Cnare, Oberkampf, Beard & Cowan, The Electromagnetic .theta. Gun and Tubular Projectiles, pp. 46-59;

(4) Snow, Dunbar, kubby, O'Neill, Mass Driver Two: A Status Report pp. 127-134.

IEEE Transactions On Magnetics, vol. MAG-20, No. 2, 3/84:

(1) Kolm & Mongeau, "Basic Principles of Coaxial Launch Technology", pp. 227-230

(2) Burgess & Cowan, Multistage Induction Mass Accelerator pp. 235-238

(3) McKinney and Mongeau, Multiple Stage Pulsed Induction Acceleration, pp. 239-242.

Detail Description of the Preferred embodiment

As shown in Fig. 1A, one of, but not limited to, the preferred embodiment, a thick sheet metal core means 200, such as Aluminum or Copper, is formed as a fan type disc with a number of holes 200-1, -2, -3, ... , -12 in it. Such a metal disc forms the rotor of the said flat induction motor. Fig. 1B shows the same design but from a different view perspective.

Additional stationary coil block can be seen in Fig. 1A, the number of coil module means 100 can be determined by the amount of thrust and complexity of design is desired. The coil module means 100-1,-2, ... can be mounted following the circular shape of the metal disc. (reference to part of Fig. 8) Here in Fig. 1A, 1B only 2 coil module means are shown. As the original principle teaches, the coil module means 100 produces pulsed magnetic field that will be peak in strength depending on the relative position of the metal core means and the coil module means. When the metal portion 200-1, -2, -3, ... , -12 of the metal core means pass through the suitable position in related to the coil's position, the current in the coil is pulsed on/off to provide the driving force so that the metal core means is moved into a rotation.

The metal portion that act as the rotor's driving part can also served as the spoke of the wheel structure. So that not too many extra weight is incurred during the usage of this invention. The design of the wheel structure using this invention will remain very much like the existing one, so minimum changes is need through the related industrial infrastructure. Even multiple metal bar can be assembled onto a hub and rim so that the metal portion can serve the same purpose of the above mention design. Yet another application can be designed so that the present invention served as part of the hub or rim of the wheel design.

Fig. 2 is another type of embodiment similar to Fig. 1's design, but in this embodiment, the center of rotation or the axis is no longer necessary as the traditional motor design. The bearing or fixation of the rotor can now be implemented along either the outer circle or the inner circle of the donut shaped rotor. All the above design can be used also as a replacement of the metal disc that is used in present day's vehicle's brake disc as can be seen in a modern vehicle design.

Fig. 3 is another typical embodiment. Here the metal core means 600 is being arranged as a metal strip bended into a circular shape. Slot is being formed along the metal strip so that separated metal portion 600-10, -20, -30, -40, -50, -60, ... , -(n+1) is formed in the strip. As the original driving principle teaches, the number of coil module means 500 can be determined depend on the driving force needed and the complexity that can be used.

The bearing or fixation of the rotor can now be implemented along either the outer circle or the inner circle of the duct shaped rotor. Fig. 3A & B shows only one pair of coil module means 500-n and 500-m, but in Fig.3C, a plurality coil module means 500-10, -20, -30, ... , -(n-1), -n, -(n+1), ... , -(m-1), -m, -(m+1) sets is shown.

Fig. 4 is also another similar design that can be used. The bearing or fixation of the rotor can now be implemented along either the outer circle or the inner circle of the duct

shaped rotor. With suitable mechanical design modification and integration, existing wheel system can be modified to incorporate the present invention so that minimum changes is necessary to the existing mechanical system.

Components with different dimension and shapes can be employed without deviating from the intention of the invention. The above mentioned embodiment is listed merely to demonstrate a particular embodiment of the invention and should not become a limitation to the claim of the invention.

With the present invention, a HPV can be designed so that the flat induction motor will serve as an active propelling wheel with much less extra weight added to the HPV. As HPV is usually started with human efforts, the start up of the flat induction motor will usually be made after the HPV is up and running, which will make the present invention a even more attractive propelling tool as no extra kick start mechanism is required.

However, should initial start up is needed, a minimum extra weight is needed as one can make suitable combination of more than one of the listed embodiment or the like together with suitable clutching device to implement a kick start up device. Such a start up device can be implement with 2 ~ 3 different motor, a first suitable flat induction motor will be driven by a third small motor to start up with, and when the first flat induction motor reach suitable driving status that it can be clutched with yet another flat induction motor, which serve as the main driving motor of the vehicle intended.

The wheel and related load 110 will be driven by the 120 first flat induction motor 25 into motion via any combination of a suitable clutching device 110-10, a typical clutching mechanism 110-10 is shown in Fig. 5. Due to the use of clutching device 110-10, the 230 second motor 35 together with its related driving mechanism 230-10, such as pullet or belt or gear or chain or the like, can be used to start the rotation of the relatively light loading of the metal core means of the said first flat induction motor 25.

When the said first flat induction motor 25 have reached its thrust momentum, suitable mechanical means can be employed to make the clutching of the 120 said first flat induction motor 25 so that it will now be able to drive the said wheel and related load 110, which is linked to the mass of the vehicle body.

In Fig. 6, the wheel and related load 140 will be driven by the 150 first flat induction motor 26 into motion via any combination of a suitable clutching device 160, a typical clutching mechanism 160 is shown in Fig. 6. Due to the use of clutching device160, the 280 second motor 36 together with its related driving mechanism 280-10, such as pullet or belt or gear or chain or the like, can be used to start the rotation of the relatively light loading of the 150 said first flat induction motor 26. When the 150 said first flat induction motor 26 have reached its thrust momentum, suitable mechanical means can be employed to make the clutching of the 150 said first flat induction motor 26 so that it will now be able to drive the said wheel and related load 140, which is linked to the mass of the vehicle body. As described earlier, the coil module means 270 will be arranged to fit the suitable mechanical design.

And Fig. 7 show yet other embodiments that can be used for such a kick start up device. In Fig. 7, the said wheel and related load 170 will be driven by the 180 first flat induction motor 27 into motion via any combination of a suitable clutching device 180-10, a typical clutching mechanism 180-10 is shown in Fig. 7. Due to the use of clutching device180-10, the 900-30 second motor 37 together with its related driving mechanism 900-40, such as pullet or belt or gear or chain or the like, can be used to start the rotation of the relatively light loading of the 180 said first flat induction motor 27. When the 180 said first flat induction motor 27 have reached its thrust momentum, suitable mechanical means can be employed to make the clutching of the 180 said first flat induction motor 27 so that it will now be able to drive the said wheel and related load 170, which is linked to the mass of the vehicle body. As described earlier, the coil module means 900-10 will be arranged to fit the suitable mechanical design.

The plurality alternative embodiments of the start up mechanism should not be a limitation to the present invention, but only serve as a similar device comprising part of this invention.

Fig. 8 illustrate a typical embodiment of the invention in a HPV situation. The flat induction motor can be mounted on either only one wheel or on both wheel. In Fig. 8, the metal core means 200-100, 200-200 of the said flat induction motor can be implemented as either the spoke or part of the rim or part of the hub. While the coil module means 100-100, 100-200 can also be arranged as a plurality numbers of pairs, 100-XXX. The relative positions of the coil module means 100-XXX can be arrange to fit the shape of wheel structure.

The details of the mechanical or electrical design can be dependent on the purpose of the vehicle. The plurality alternative embodiments should not be a limitation to the present invention, but only serve as a similar device comprising part of this invention.

Fig. 9 show yet other embodiments that can be used for such a kick start up device. In Fig. 9, the 191 second flat induction motor 19 will be driven by the 195 first flat induction motor 29 into motion via any combination of a suitable clutching device 190-10, a typical clutching mechanism 190-10 is shown in Fig. 9. Due to the use of clutching device190-10, the 390-30 third motor 39 together with its related driving mechanism 390-40, such as pullet or belt or gear or chain or the like, can be used to start the rotation of the relatively light loading of the 195 said first flat induction motor 29. When the 195 said first flat induction motor 29 have reached its thrust momentum, suitable mechanical means can be employed to make the clutching of the 195 said first flat induction motor 29 so that it will now be able to drive the 191 said second flat induction motor 19, which is spin around the axis of spinning. The 191 said second flat induction motor 19 is linked to the mass of the vehicle body and will be the main